its execution. In this respect Renou agreed with the words of Mascart.

M. Teisserenc de Bort thanked the President, Mascart, for the interest that he has shown, which would be a great encouragement to himself and his colaborers; he added that he already had a small captive balloon of about 40 cubic meters capacity, intended for preliminary experiments, but the cable has not yet been received; but in the course of last spring he had, by the aid of small models made of gold-beater's skin, made a series of researches on the best form for these aerostats, and hopes that he may, with patience, finally arrive at a practical solution.

LOCAL CLIMATIC CHANGES.

A correspondent in Northfield, Mass., desires our opinion on the question: "Were the winters of fifty or seventy-five years ago much colder, or were the snowfalls deeper than at present? The opinion is widely held that the winters were colder and the snowfalls deeper, but I can find nothing to warrant the belief except that in the first part of the century a much larger percentage of the population lived in the hill towns or in the interior, which are both colder than the valley or the coast towns."

On the general question as to appreciable changes in climate the Editor's opinion is that there has been no such change in any respect whatever so far as meteorology proper is concerned. If we divide our records of the weather recorded in North America since the days of Columbus into two periods, viz, before and after the year 1800, we shall find that every peculiarity, such as remarkable storms, winds, rains, floods, frosts, etc., recorded in the current century can be matched by a corresponding remarkable event before the year 1800. The popular impressions alluded to by our correspondent result almost entirely from the imperfections of our records and especially of our memories. There is a large class of persons whose habits of thought are so crude that when they experience any very remarkable weather they jump to the conclusion that the climate has changed, forgetting that they themselves have had such a limited personal experience that they are not fair judges of the weather over the whole country or of the climate of a century.

Our correspondent seems to suggest that a certain change in the habits of the people, such as the removal from the interior to the coast, or from forests to prairies, or from country to city, or vice versa, will partly account for widespread errors in respect to climate. The suggestion is excellent, but the Editor would be inclined to interpret the phenomenon somewhat differently. The general movement of the population in the past century has been from the Atlantic States westward, and from the country to the city, or quite opposite to the movement suggested by our correspondent. In fact, we find no real agreement in the so-called popular traditions with regard to the weather. We have met with quite as many persons who think the winters are more severe as with those who think the winters are less severe than formerly. Everything seems to depend upon how and where the "oldest inhabitant" lived when he was a boy as compared with his present condition. If he moved from a farm on a windy hilltop in the country down to a cosy house in the village, the climate seemed to him to have improved. If he moved from the milder climates on the coast in his youth to the severer climates in the interior he was, as a boy, struck with the great change, and the impression still remains with him that those winters were severer than now. If he has lived continuously in a large city like New York, where the growth of tall houses, the increased smoke, and diminished sunshine have completely changed the climate, and where these combined with the changes in the mode of living, especially the abolition of the open wood fire, have rendered the human system vastly more sensitive he finds that the inequalities of climate are greater than formerly.

From a hygienic point of view "the climate" includes everything that affects the health and comfort of the body. The meteorological climate that agrees perfectly with one person may be entirely too severe for another. Our remembrance of our physical sensations is not a safe criterion when judging of climate. Our remembrance of an occasional storm or winter is not a safe guide in comparing the past with the present. Our records of deep snows are too fragmentary to give anything more than a general conviction that there has been no material change in the snowfall. Our records of extreme low temperatures are liable to be in error several degrees by the ancient use of very imperfect thermometers and are almost certain to be exaggerated if the thermometers were placed in valleys or lowlands where cold air settles on still, clear nights, so that we must use great caution in interpreting these records; differences of 5, 10, and even 20 degrees have occurred between the minimum temperatures recorded by Weather Bureau and voluntary observers located within a few miles of each, owing to the combination of these two sources of error.

Remarkable rains and snows are usually quite local phenomena; there have been several remarkable cases of this nature in certain portions of New England and the Middle Atlantic States within the past ten years. Similar remarkable cases occurred in other portions of these States fifty years ago and equally remarkable cases occurred in still other portions just before 1800. If there has been any change in the climate of Northfield, Mass., it is because it lay within some one of these regions of extraordinary rain or snow on one occasion and not on another. Such a change of climate at one spot is no criterion by which to judge of changes at other places 100 miles away. The average climate of New England so far as the weather is concerned has not appreciably changed since the days when her oldest forest trees were young saplings, and that carries us back nearly five hundred years.

THE CELEBRATION OF THE SEMICENTENNIAL OF THE ROYAL PRUSSIAN METEOROLOGICAL INSTITUTION.

One of the evidences of the youthfulness of meteorology lies in the fact that so few institutions established to promote this branch of science have come down to us from ancient date. To be sure we have the famous Tower of the Winds, established in classical times in Athens, and the valuable meteorological records kept by Tycho Brahe at Uranianborg in his royal observatory on the island of Huena, in the Kingdom of Denmark. But these observatories have long since become obsolete, and all existing institutions for the promotion of meteorology, whether they are individual observatories or extensive weather bureaus, are of recent date. One of the early official recognitions of meteorology, as a matter of observation and record, was that made by the United States, when on April 29, 1817, Josiah Meigs, as Surveyor-General of the United States, asked for monthly records from the surveyors or registers of the Land Office scattered throughout what was then the western portion of our territory.

In the next year, 1818, Surgeon-General Joseph Lovell ordered the surgeons at military posts to keep regular records of the weather, in accordance with a suggestion made by Hospital-Surgeon Dr. Benjamin Waterhouse, and in continuation of a military order of May 2, 1814, which made it the duty of hospital surgeons to keep a diary of the weather. From that date until now the records of the Surgeon-General's Office have been maintained uninterruptedly and published in several successive meteorological registers.

On the other hand, the records of the Land Office, which were first published in Niles' Register, expanded into those of the Patent Office and the Commissioner of Agriculture, and eventually of the Smithsonian Institute, and were finally transferred to the Weather Bureau. Among the observers of the Medical Department of the Army was Assistant Surgeon A. J. Myer, who subsequently became Chief Signal Officer of the Army and Brigadier-General. He was the distinguished founder of the Weather Bureau and of the present system of storm and weather signals. But although the present Weather Bureau of the United States can thus trace the steps by which its climatological work developed from the seeds planted in 1814 and 1817, yet it will not for many years have a right to celebrate the fiftieth anniversary of its existence as a Government institution. Meanwhile we must congratulate our European colaborers on the early establishment of the existing meteorological systems of Belgium (by Quetelet in 1826), of the Netherlands (by Buys-Ballot in 1847), of Russia at St. Petersburg (by Kupffer in 1840), and Austria at Vienna (by Kreil in 1851). We owe to Humboldt the general stimulus that in the first half of this century pervaded all Europe in regard to the study of every branch of terrestrial physics. His influence was always given, directly and indirectly, toward the establishment of government bureaus, primarily for the collection of climatic and magnetic statistics, but eventually for the preparation of daily weather maps, the prediction of the weather, and the study of dynamic meteorology.

The recent brilliant celebration of the semicentennial of the Royal Prussian Meteorological Institution deserves to be brought to the attention of Americans, as emphasizing the distinguished recognition of science by the German Government. To the German mind, knowledge is science and science is power. In America there is a hazy uncertainty as to what constitutes science, but our citizens are certain that knowledge is money; therefore, our Weather Bureau, established for the purpose of forewarning storms, and thereby saving life, property, and money, is popularly supposed to be practical rather than scientific. But it would be a sad mistake to imagine that the Weather Bureau will be able, year after year, to respond to the steadily increasing demands for greater minuteness and greater accuracy unless the people give it the means to employ the best available talent in the study and discovery of the laws and combinations of laws that control the changes in the weather. The art of predicting is simply the application of the knowledge of the forecast official. If he knows only a few elementary generalizations, his predictions must be correspondingly indefinite. The more thorough his knowledge of the physics of the atmosphere, the better his predictions must be. Perfect art implies, necessarily, a higher science behind it.

At present no one has a satisfactory knowledge of the mechanical and thermal processes going on in the atmosphere. We are all learners. We, therefore, welcome the high recognition given in Germany to meteorological science as an evidence that that government is laying a sure foundation for future high attainment in the art of weather prediction.

The following account is abridged from an editorial article by Prof. Dr. R. Assman, editor of Das Wetter, a monthly meteorological journal, for November, 1897:

On the 17th of October, 1847, Frederick William IV, King of Prussia, signed the decree allowing the establishment of the Royal Meteorological Institute, the importance of which had been shown by Alexander von Humboldt in repeated addresses. On the 16th of October, 1897, the fiftieth anniversary of this day was celebrated in the most appropriate manner in the presence of their Majesties the Emperor and Empress of Germany and the two eldest of the princes.

The quarters occupied by the Meteorological Institute in the old Academy of Architecture, No. 6 Schinkelplatz, Berlin, are extremely limited and inconvenient and have long since ceased to respond to the official needs. On the other hand, at the observatory of the institute, lately erected on Telegraph Hill at Potsdam, there are no large rooms sufficient for a celebration of this kind. It was, therefore, necessary to go elsewhere, as guests, and accept the hospitality of the Royal Geodetic Institute, whose building, also erected on Telegraph Hill, offered a memorial hall in which a company of about one hundred and fifty persons could be accommodated.

The jubilee festivities were divided into three parts: An address in the Memorial Hall, a visit of inspection to the Magnetic and Meteorological Observatories of the Institute, and a banquet in the hall of the Palace Hotel in Berlin.

Shortly after 3 p. m. their Majesties and the Imperial Princes, accompanied by a brilliant retinue, arrived and found waiting for them a company composed of the highest Government officials and representatives of science, and also the son and nephew of the distinguished Dove, who for so long a time was Director of the Institute. After the festivities were initiated by singing the 23d Psalm by the men's Choral Society of Potsdam, the director of the institute, Professor von Bezold, delivered the memorial address, in which he sketched the activity of the institution during the whole period of its existence, showing the important part it had taken in the progress of science. The methods of investigation peculiar to climatology demand thousands of conscientious and accurate observers, but the study of averages and statistics also necessitates that the processes going on in the atmosphere can only become objects of earnest investigation a considerable time after they actually occur. The first director, Mahlmann, held that office only a short time and was succeeded by Heinrich Wilhelm Dove, who, without controversy, elevated this meteorological institute to the highest position among all similar establishments throughout the world at that time. After the German Empire had been founded and a central place for certain definite branches of investigation had been found for all German meteorology in the Seewarte (Marine Observatory) at Hamburg the necessity for reorganization of the Prussian Institute at Berlin became daily more evident, since it was evident that the exclusive statistical method that had been adopted there for many years could not lead to the desired end; the great development of the physical sciences demanded that they should control in the study of the atmosphere. Therefore, in the year 1885, the institute was greatly enlarged and adapted to its new problems by the addition of the appropriate men of science.

At the present time, in order to obtain fundamental material for climatological investigations there are 188 stations of the higher class, 1,336 thunderstorm stations, and 1,844 rainfall stations; scientific balloon ascensions on a larger scale than have hitherto been made also contribute material of the highest value for the study of the physics of the atmosphere. This material is reduced, analyzed, and discussed at the Central Institute in Berlin; the distribution of meteorological knowledge is provided for by instruction at the University, given by members of the staff; the experimental investigations are conducted at the Meteorological and Magnetic Observatory in Potsdam. This latter institution in connection with the astrophysical and the geodetic institutions on the same locality (Telegraph Hill) at Potsdam, inasmuch as each of these institutions carries out a special field of investigation, constitute altogether a microcosmos located, as it were, at a definite point on a line extending from the center of the earth outward to the stars; the work special to meteorology occupies a somewhat more limited field than that of the other two establishments.

At the close of the address the Minister of Education announced certain decorations to be given in connection with the Jubilee celebration. The great golden medal in science was presented to the Director of the Institute, von Bezold; the Order of the Crown (3d class) was given to Hellmann, as Chief of the First or General Division of the Central Institute; the Order of the Red Eagle (4th class) was bestowed upon Sprung, Chief of the Third or Instrument Division and Director of the Meteorological Observatory; the Order of the Crown (2d class) was given to Vogel, Director of the Astrophysical Observatory. It was especially pleasant to notice that a relatively large number of the friends of meteorology and the honored observers of the Institute received thanks for their patient labors. Among these, Professor Gruhn, of Meldorf, Professor Mohl, of Cassel, Professor Paszotta, of Konitz, the publisher, Alexander Faber, of Magdeburg, and, finally, Freidrich Treitsche, as proprietor of the Mountain Observatory, on Inselsburg, near Erfurt, received the Order of the Red Eagle (4th class).

After a final song the company made a tour through the Meteorological and Magnetic Observatory, examining in the most detailed manner the instruments and the building. In the evening most of the guests assembled at the banquet in Berlin. The Minister of Education gave a brilliant sketch of the activity of the Institute and the generosity of the Emperor in assigning special funds for the study of the upper atmosphere. Neumayer, the director of the Seewarte, at Hamburg, expressed the best wishes for the future of the Meteorological Institute. Von Bezold, director of the Institute, thanked the Government as well as his friends, the guests, for the honor which they had done him. Numerous addresses and telegrams of congratulation were received from all parts of the world. Among these, that from the Grand Duke Constantine, expressing the congratulations of the Imperial Russian Academy of Sciences, was most warmly received.

METEOROLOGICAL STATION IN TERRA DEL FUEGO.

Mr. Moses Y. Ransom, of Cleveland, Ohio, writes that he is about to establish a business plant on the south shore of Terra del Fuego, which will remain there about three years. He has already sent the Weather Bureau some records kept in this locality during the past year, and as the proper interpretation of these records requires some knowledge of the topography and surroundings of this locality we print the following description from Mr. Ransom's notes:

If you will examine the nautical charts of the Strait of Magellan, the waters of Terra del Fuego, and the isthmus to the south, you will see a large area of land and water that has no parallel on this globe, a country beyond 53° south latitude, with a temperature seldom below freezing point and yet never warm. Its high mountains reach up into a frigid temperature, while their bases are continually washed by the warm waters of the Pacific, resulting in an atmosphere that is too damp to dry a cotton cloth in the open air. There are channels of water in every direction, 1 to 3 miles wide, fiords cut perpendicularly down from the summit to the water level, 3,000 to 4,000 feet, and then, below you, there are still from 10 to 300 fathoms of water. All over this section, particularly to the westward, are elevations rising to 4,000 and occasionally to 8,000 feet. There are thirty to fifty great glaciers, and all around below them the beech trees and the tropical magnolias, which are evergreens here. In some places grass grows on decayed grass roots all the year round, and so long has this endured that there is frequently an accumulation of wet, decayed vegetable matter under these roots. You can push a bamboo pole down 16 feet. The tidal rise and fall is 40 feet at the first narrows in Magellan Strait; 60 miles farther in the tide rises from 4 to 6 feet; in the southern channels, practically no tide, but a current, apparently driven by the wind. The albatross, the penguin, the parrot, and the canary bird live here. The barometer falls with a wind from southwest for one day and then rises with a gale from the southwest a few days later; and the same may be said for winds from every other point of the compass. I had my yacht hove to, riding out a heavy gale of wind off Cape Horn Island for four days. On my return to the station, only 60 miles northward, I found that they had had continued good weather on the land and no evidence of a gale 60 miles away from them. I can get no position on the land that the winds are not controlled in direction by the high mountains and valleys. Good observations of the clouds are generally obscured by the masts and rigging above us. I can not take temperature by the wet and dry bulb, for both of them are constantly wet. There are but few days when we can get the true temperature of the ocean; the surf is so tremendous that you can only catch a part of a pint of water high up on the beach.

RECENT EARTHQUAKES.

Prof. Edward W. Morley of Adelbert College, Cleveland, Ohio, reports that his seismograph showed no earth tremor during the current month. The same may be said of the Marvin seismograph at the Weather Bureau in Washington.

On November 4 a severe shock of earthquake was reported at 2:29 a. m. over portions of Idaho, Montana, and Utah. The shock was especially severe at Dillon. A second shock was felt, but not so severely, over the same area at 7 a. m.

On Sunday, October 31, about 4 p. m., a mysterious detonation shook the ground at Niles, Mich. It is by no means certain that this was due to an explosion of gunpowder, as at first supposed, or to an earthquake. It frequently happens that noises and vibrations, and the destruction of window glass are produced by the passage of great meteors which are, themselves, hidden by clouds or the bright sunshine, and this may easily have been the case at Niles.

WEATHER BUREAU STATION ON MOUNT TAMALPAIS.

In the September number of the MONTHLY WEATHER REVIEW the reader will find the first report of Mr. W. H. Hammon, forecast official at San Francisco, on the results of meteorological observations made during his recent stay on the summit of Mount Tamalpais. His observations and conclusions satisfactorily demonstrated the probable usefulness of that station in weather forecasting, and it was his report only that justified the Chief of Bureau in deciding to recommend to the Secretary of Agriculture that the Bureau incur the expense of a permanent establishment at that point. It was necessary to have this positive report from an experienced forecast official before the establishment of such a station could be decided upon. In former years Mount Washington, Pikes Peak, and Mitchells Peak were all occupied by the Weather Bureau as mountain stations, hoping thereby to directly increase the accuracy of the forecasts, besides also adding to our knowledge of the phenomena of the upper atmosphere; but in the progress of time exigencies arose that demanded the surrender of these stations, and regrettable as that was from the point of view of the student of meteorology, yet it must be confessed that the daily forecasts did not suffer therefrom. When, therefore, petitions and letters from the citizens of California were received, urging the establishment of the Tamalpais station as a popular desideratum, the first inquiry naturally was, "Will this station be sufficiently advantageous to the forecaster to justify its maintenance?" and that question could only be answered by allowing Mr. Hammon to occupy it for a sufficiently long time. The phenomena that he reported from the summit were the first that the Weather Bureau had received directly bearing on the question of weather predictions for California from local indications of temperature, wind, and sky, as compared with general indications furnished by the barometer and the daily weather map.

It is true there was on hand a report from Prof. George Davidson, the distinguished representative of the Coast and Geodetic Survey, urging the value of the station from a general meteorological point of view and as a lookout for telegraphically announcing passing vessels, which are hidden by the fog within the Golden Gate; but this was not quite the point of view of the Weather Bureau forecast official. Mr. Davidson occupied the Coast Survey station on Tamalpais from December, 1858, to March, 1859, and again from July to September, 1882. In 1883 he urged the establishment of an observatory, and interested Mr. William T. Coleman, of San Francisco, in the project. They secured funds and built a wagon road to the summit of the mountain. The land, the house, and the telegraph line were provided for, when, suddenly, some one opposed the project and frustrated all further efforts. Professor Davidson's report says:

The great obstacle to the free and unrestricted navigation of our coast and of the entrance to San Francisco harbor is the prevalence of fogs. During the months of July, August, and September, 1882, these fogs were extremely persistent from the Golden Gate seaward to and beyond the Farallones. In the neighborhood of Point Reyes there has been as long a period as thirty-nine days of continuous fog.

During the other months there is much fog, and sometimes it is continuous and very dense. From observations directly on Tamalpais, and also from surrounding mountain tops, I have found that this fog cloud attains an average height of 1,400 or 1,500 feet above the sea; but it sometimes rises so high as to envelop the summit of Tamalpais. In all ordinary fogs the observer on the mountain will occasionally see the fog dissipate along the immediate shore line in the greatest heat of the day, and close up again at night. Sometimes he sees the Golden Gate blocked by fog far beyond the Heads, and large areas of the Gulf of the Farallones clear of fog, with vessels here and there that could see nothing but the mountain. At times the southeast Farallone will be covered, and large areas free; so with Point Reyes. Then, again, the Farallones and Point Reyes will be clear, but fog nearly cover the Gulf. My experience clearly indicates that the locality of the maximum fog in the Gulf of the Farallones lies between the Heads and Point Reyes, and this is confirmed by the record for fog signals. The fogs at the Heads are much more frequent than at the southeast Farallone. In 1883 the average monthly record of the fog signal at that island was ninety hours, and one hundred and fifty-four hours at Point Bonita.

In the areas of partially dissipated fog in the Gulf and in the Golden Gate I have seen the mastheads of vessels above the low-lying fog, in which their hulls were invisible; so that a lookout at the masthead could have certainly gotten the direction of Tamalpais. Moreover, a signal officer on the mountain could have known her signals. Of course, there are times when the mountain top is covered with a cloud cap while all below is moderately clear. This condition usually precedes southeast weather and does not arise from fog. Telephonic communication with the city station would cover such infrequent cases.

Throughout the year the broad outlook from Mount Tamalpais will help the signal officer, because he is not hampered by the local and